

A FIELD STRATEGY TO MONITOR RADIOACTIVITY ASSOCIATED WITH INVESTIGATION DERIVED WASTES RETURNED FROM DEEP DRILLING SITES



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The U.S. Department of Energy, Nevada Operations Office, Underground Test Area Operable Unit (UGTA) is drilling deep (>1500m) monitoring wells which penetrate both vadose and saturated zones potentially contaminated by sub-surface nuclear weapons testing at the Nevada Test Site. Drill site radiological monitoring returns data on drilling effluents to make informed management decisions concerning fluid management. Because of rapid turn-around required for on-site monitoring, a representative sample must be analyzed simultaneously for α , β and γ emitters by instrumentation deployed on-site. For the purposes of field survey, accurate and precise data can be returned, in many cases, with minimal sample treatment.

A 30% efficient high purity germanium detector and a discriminating liquid scintillation detector are being evaluated for γ and α / β monitoring respectively. Implementation of these detector systems complements a successful on-site tritium monitoring program.

Residual long lived radioactivity associated with underground nuclear tests include tritium, activation products, fission products and actinides. Pulse shape discrimination (PSD) is used in alpha/beta liquid scintillation counting and is a function of the time distribution of photon emission. In particular, we hope to measure ^{241}Am produced from ^{241}Pu by β decay. Because ^{241}Pu is depleted in fissile bomb fuels, preconcentration and maximum PSD resolution will be required. The germanium detector employs a multichannel analyzer to count gamma emitting radionuclides; we will designate specific window configurations to selectively monitor diagnostic fission product radionuclides (i.e. ^{137}Cs).

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